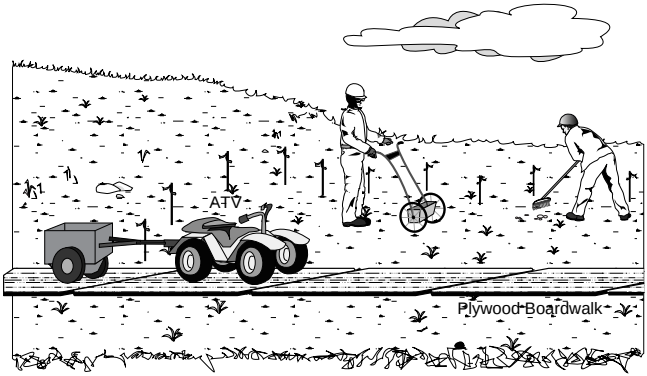

Seeding to revegetate damaged tundra can increase vegetative cover, help control thermokarst and erosion, improve site aesthetics, and develop root mat and organic matter to support growth of plant communities. Prepare the tundra surface by roughing it with a rake. Broadcast the seed using a cyclone spreader (or by hand in small areas). Rough the seeded tundra surface with a rake to work the seeds into the soil or the root mat. This technique will increase seed contact with the soil or organic matter and provide some protection from birds. Cyclone spreaders are commercially available in different seed capacities and models that can be pushed, pulled with a vehicle, or carried by one person on foot.

Even distribution of seed may require some practice. One method is to measure and mark off an area to be seeded, fill the spreader with the amount of seed appropriate for the given area, and move in a grid pattern at a steady pace over the area multiple times until the spreader is empty. Calibrate the spreader before use.

The type of seed to use depends on the tundra type, material spilled, and goals of seeding. For instance, if the goal of seeding is to provide temporary vegetation cover on salt-affected moist tundra until the natural plant community can re-establish itself, the grass *Puccinellia arctica* is a reasonable choice. This plant is salt-tolerant, establishes quickly, and offers little competition to natural succession. The application rate may be adjusted depending on the goal. To protect against erosion, use a higher rate to quickly establish dense growth.

Planting a mixture of seeds may be appropriate if a diversity of plants is desired or if a site has varied topography (e.g., tussocks, patterned ground). For such a site, different seeds will be successful in different areas within the site. To calculate the application rate for a seed mixture, multiply the single-species

Examples of Seeds and Application Rates Used for North Slope Tundra Revegetation

PLANT NAME	WHERE TO GET SEED	TUNDRA TYPE	APPLICATION RATE* (lb/acre)	COMMENTS
Poa glauca	Commercially available	Dry and moist	5	Provides cover quickly when fertilized. Keeps other plants out. Does well in mineral soils.
Festuca rubra	Commercially available	Moist and wet	9	Provides cover quickly when fertilized. Keeps other plants out. Does well in mineral soils.
Arctagrostis latifolia	Commercially available	Moist and wet	4	Provides cover quickly when fertilized. Keeps other plants out.
Puccinellia arctica	Commercially available	Dry to wet	2	Salt tolerant. Provides cover quickly and offers little competition to natural succession.
Dupontia fisheri	Hand collect seed, or transplant (Tactic T-22)	Moist and wet	1	Salt tolerant.
Puccinellia langeana	Hand collect	Dry to wet	2	Salt tolerant. Provides cover quickly and offers little competition to natural succession.
Sedum rosea	Hand collect	Dry and moist	1	Salt tolerant.
Cochlearia officianlis	Hand collect	Dry and moist	2	Salt tolerant.
Elymus arenarius	Hand collect seed, or transplant (Tactic T-22)	Dry and moist	6	Salt tolerant.

*Based on 100 seed per acre coverage and application of single species (unpublished information from Jay D. McKendrick)

rate of each seed type by the percentage of the seed to be used in the mixture. For instance, if using a mixture of 50% *Poa glauca* (5 lb/acre if used alone) and 50% *Festuca rubra* (9 lb/acre if used alone), the mixture would contain 2.5 lb/acre *Poa glauca* and 4.5 lb/acre *Festuca rubra*.

Commercial sources for seeds in Alaska include, but are not limited to, Plant Materials Center in Palmer, Alaska Garden and Pet Supply in Anchorage, Northern Native Seeds in Palmer, and Phillip Smith Associates in Palmer.

Hand-collect seed from stands of the desired species while the plants are in seed (the plants need not be adjacent to the site), and collect the seed heads or pods by hand into cloth bags. Dry the seed heads/pods in the cloth bags, and have the material threshed, cleaned, and tested for purity, germination, and weight by a commercial seed processor. Plant the seed, or seal in bags, and store in deep freeze for future use (it is not known how long native seeds will remain viable in storage). An advantage of collecting seed near the spill site is that the seed will be adapted to local conditions.

APPLICABILITY

	APPLICABILITY	COMMENTS
SPILLED SUBSTANCE	All	• The seeds of some plant species tolerate crude oil or high salt levels.
TUNDRA TYPE	All	• Type of seed planted will depend on tundra type.
SEASON	Spring, summer, fall	• Preferable to plant near the beginning of the growing season, but not necessary.

CONSIDERATIONS AND LIMITATIONS

- Seeding success depends on soil conditions (nutrient availability, moisture, and contamination levels). Fertilizer (Tactic T-17), aeration (Tactic T-16), irrigation (Tactic T-15), and tilling (Tactic T-19) may help seeding success.
- Data on seed germination, purity, and weight are needed to determine application rates.
- Certain seeds are not salt-tolerant. If the site is near the coast or saline substances were spilled, test the soil for salt before seeding (Tactic AM-4).
- Seeding with spill-tolerant non-native species can provide short-term benefits (increased vegetative cover, erosion and thermokarst control), but may inhibit re-establishment of native plant communities (McKendrick, 1997a). Seeding with native species is currently preferred.
- Recently seeded sites may be attractive to birds and wildlife. It may be desirable to keep them — as well as humans — away from the site.
- Seeding has been adapted for tundra treatment from temporal-zone agricultural practices and has been used with good short-term results in North Slope wet- and moist-tundra treatment regimes (McKendrick and Mitchell, 1978; Kidd et al., 1997; Cater et al., 1997; Cater and Jorgenson, 1999). Limited test data exist which document whether the use of this tactic results in long-term benefits to crude oil-affected tundra compared with other tactics, combinations of tactics, or “no action.”

EQUIPMENT, MATERIALS, AND PERSONNEL

- Necessary quantity of appropriate seed, purchased or hand-collected
- Pruners, shears, other plant-cutting tools (1 worker per tool) – to hand-collect seed
- Cloth bags (1 worker per bag) – to collect and dry seed heads or pods
- Rakes (1 worker per rake) – to prepare tundra surface for seeding, cover seed after seeding
- Cyclone spreader (1 operator) – to broadcast seed
- Vehicle approved for tundra travel (1 operator) – to pull a cyclone spreader for larger sites